Notice of Allowability	Application No.	Applicant(s)	
	10/551,068	VAN DEN BRINK, JOHAN SAMUEL	
	Examiner	Art Unit	
	Jonathan G. Cwern	3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *8/1/07*.

2. ☒ The allowed claim(s) is/are *1-20*.

3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☒ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Tom Kocovsky on 10/23/07.

The application has been amended as follows: **Amendment to the Claims:**

1. (Currently Amended) A method of perfusion imaging comprising:

performing a first magnetic resonance data acquisition with gradient encodings for random motion at a first low b sensitivity value;

performing a set of at least six second magnetic resonance data acquisitions with gradient encodings for random motion in different directions at second sensitivity values larger than the first low b sensitivity value; and

determining a perfusion tensor based on the magnetic resonance data acquisitions.

2. (Previously Presented) The method of perfusion imaging of claim 1, the second sensitivity values being below 50 s/mm^2 .

3. (Currently Amended) The method of perfusion imaging of claim 1, wherein the first low b sensitivity value is substantially zero and the second sensitivity values being between five and thirty.

4. (Previously Presented) The method of perfusion imaging of claim 1, the magnetic resonance data acquisitions being performed by a series of single-shot echo-planar magnetic resonance data acquisitions.

5. (Previously Presented) The method of perfusion imaging of claim 1, further comprising:

performing a perfusion tensor visualisation.

6. (Currently Amended) The method of perfusion imaging of claim 5, further comprising:

deriving directional information from the perfusion tensor, the performing of a perfusion tensor visualization including visualizing the derived directional information.

7. (Previously Presented) The method of perfusion imaging of claim 1, further comprising:

determining first slope values between each one of the set of magnetic resonance data acquisitions and the first magnetic resonance data acquisition; and

determining the perfusion tensor based on the first slope values.

8. (Previously Presented) The method of perfusion imaging of claim 1, further comprising:

performing a third magnetic resonance data acquisition at a third sensitivity value;

performing a fourth magnetic resonance data acquisition at a fourth sensitivity value, the third sensitivity value being higher than the second sensitivity values, and the fourth sensitivity value being higher than the third sensitivity value;

determining a diffusion coefficient and a fraction value based on the third and the fourth magnetic resonance data acquisitions to provide a diffusion signal component;

eliminating the diffusion signal component from the magnetic resonance data acquisitions to provide a perfusion signal component; and

determining a perfusion tensor from the perfusion signal components.

9. (Previously Presented) The method of perfusion imaging of claim 8, wherein a set of at least six third magnetic resonance data acquisitions with gradient encodings for random motion in different directions at third sensitivity values is performed, and a set of at least six fourth magnetic resonance data acquisitions with gradient encodings for random motion in different directions at fourth sensitivity values is performed, and the diffusion tensor is determined based on the third and the fourth magnetic resonance data acquisitions to provide a diffusion signal component.

10. (Previously Presented) The method of perfusion imaging of claim 8, the third sensitivity value being between 100 and 400, and the second sensitivity value being between 600 and 1200.

11. (Currently Amended) A method of perfusion imaging comprising:

performing a first magnetic resonance data acquisition with gradient encodings for random motion at a first low b sensitivity value;

performing a set of at least six second magnetic resonance data acquisitions with gradient encodings for random motion in different directions at second low b sensitivity values;

selecting one of the second magnetic resonance data acquisitions having the strongest measured signal decay;

performing a third magnetic resonance data acquisition at a third sensitivity value, the third sensitivity value being higher than the second sensitivity values;

determining a diffusion coefficient and a fraction value based on the selected second and third magnetic resonance data acquisitions to provide a diffusion signal component;

eliminating the diffusion signal component from the magnetic resonance data acquisitions to provide a perfusion signal component; and

determining a perfusion tensor from the perfusion signal components.

12. (Previously Presented) A computer program product comprising a digital storage medium storing a perfusion imaging program executable to perform a method including determining a perfusion tensor based on a first magnetic resonance data acquisition and a set of at least six second magnetic resonance data acquisitions, the first magnetic resonance data acquisition being performed at a first low b sensitivity value and the second magnetic data resonance data acquisitions being performed at a second low b sensitivity value with gradient encodings in different directions, the first low b sensitivity value being below the second low b sensitivity values, and further executable to perform perfusion tensor imaging.

13. (Previously Presented) The computer program product of claim 12, wherein the perfusion imaging program is further executable to determine first slope values for each one of the second magnetic resonance data acquisitions based on the first magnetic resonance data acquisition and to determine the perfusion tensor based on the first slope values.

14. (Previously Presented) The computer program product of claim 12, wherein the perfusion imaging program is further executable to determine a diffusion coefficient and a fraction value based on third and fourth magnetic resonance data acquisitions to provide a diffusion signal component, to eliminate the diffusion signal component from the magnetic resonance data acquisitions to provide a perfusion signal component, and to determine a perfusion tensor from the perfusion signal component.

15. (Currently Amended) The computer program product ~~of claim~~ of claim 14, wherein the perfusion imaging program is further executable to process a set of at least six third magnetic resonance data acquisitions with gradient encodings for random motion in different directions at third sensitivity values, a set of at least six fourth magnetic resonance data acquisitions with gradient encodings for random motion in different directions at fourth sensitivity values, and to determine the diffusion tensor based on the third and the fourth magnetic resonance data acquisitions to provide a diffusion signal component.

16. (Previously Presented) The computer program product of claim 12, wherein the perfusion imaging program is further executable to select one of the second magnetic resonance data acquisitions having the highest data value, determining of a diffusion coefficient and a fraction value based on the selected second magnetic resonance data acquisition and a third magnetic resonance data acquisition being performed

at a third sensitivity value, the third sensitivity value being above the second sensitivity values, providing a diffusion signal component based on the diffusion coefficient and the blood fraction value, eliminating of the diffusion signal component from the magnetic resonance data acquisitions to provide a perfusion signal component, and to determine of a perfusion tensor from the perfusion signal components.

17. (Currently Amended) A perfusion imaging apparatus comprising:

a magnetic resonance data acquisition device; and

a computer system programmed to cause the magnetic resonance data acquisition device to perform a first magnetic resonance data acquisition at a first low b sensitivity value and to perform a set of at least six second magnetic resonance data acquisitions with gradient encodings in different directions at second low b sensitivity values below 50 s/mm^2, the first sensitivity value being smaller than the second sensitivity values, and further programmed to determine a perfusion tensor based on the magnetic resonance data acquisitions.

18. (Previously Presented) The perfusion imaging apparatus as set forth in claim 17, further comprising:

a display unit cooperating with the computer system to perform perfusion tensor imaging based on the determined perfusion tensor.

19. (Currently Amended) The perfusion imaging apparatus as set forth in claim 17, wherein the first low b sensitivity value is substantially zero.

20. (Currently Amended) The perfusion imaging apparatus as set forth in claim 17, wherein the computer system is further programmed to cause the magnetic resonance data acquisition device to perform at least one additional magnetic resonance data acquisition at a higher sensitivity value than the second low b sensitivity values, and is further programmed to determine a diffusion signal component of the first and second magnetic resonance data acquisitions based on the at least one additional magnetic resonance data acquisition.

2. The following is an examiner's statement of reasons for allowance: the prior art does not teach or suggest determining a perfusion tensor based on magnetic resonance data acquisitions. While the prior art does teach determining a diffusion tensor, it does not teach determining a perfusion tensor. There is a clear difference between diffusion and perfusion.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan G. Cwern whose telephone number is 571-270-1560. The examiner can normally be reached on Monday through Friday 9:30AM - 6:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JC
10/25/07